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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/914,204
Filing Date: February 20, 2002
Appellant(s): MACNEIL ET AL.

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GROUP 1700

Adam C. Volentine
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed April 4, 2006 appealing from the Office action mailed July 15, 2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6383951	LI	5-2002
5,314,724	TSUKUNE ET AL	5-1994
5,897,923	TAMURA ET AL	4-1999
6,354,008	DOMOTO ET AL	3-2002

5,133,986	BLUM ET AL	7-1992
5,930,077	OBATA ET AL	7-1999
5,981,000	GRILL ET AL	11-1999

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1, 3, 5, 10-20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 2, 3, 7, 8, 15, 20, 31 of U.S. Patent No. 6,544,858 in view of Tsukune et al (US 5,314,724). Patent '858 discloses a method of depositing a silicon containing-polymer on a semiconductor wafer (See Claim 20) from silicon containing compound such as higher silane (See Claim 2) and hydrogen peroxide (See Claim 3) to a thickness of 0.3-0.5 microns (3000-5000 Angstroms) (See Claim 35) thus forming a polymer layer of claimed invention having thickness of <u>3000-5000 Angstroms</u> and including Si-C bonds, and <u>heating</u> the polymer layer by a heated platen (See Claim 7) to a temperature of <u>300^0C -500^0C</u> (See Claim 8) thereby densifying (hardening) (See Claim 31) the layer (and desorbing moisture), and treating the heated layer with RF plasma having power of less than 1 MHz (i.e. about 500 watts) (Claim 10) such as <u>oxygen plasma</u> (See Claim 5).

Patent '858 fails to teach that the treating plasma is hydrogen plasma (Claim 1).

Tsukune et al '724 teach that the plasma treatment can be conducted by oxygen plasma or hydrogen plasma (See column 12, lines 21-27). In other words, Tsukune et al teach that hydrogen plasma is functionally equivalent to oxygen plasma for plasma treatment.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used hydrogen plasma instead of oxygen plasma in Patent '858 since Tsukune et al '724 teach that hydrogen plasma is functionally equivalent to oxygen plasma for plasma treatment, and the selection of any of these known plasma treatment in Patent '858 would be within the level of ordinary skill in the art.

As to claims 10, 11, 13,15, 16, Patent '858 fails to teach that the polymer film is treated by plasma for 2-4 minutes (Claims 10, 11 and 13) to a depth of more than 3000 Angstroms (Claim 15) or less than 600 Angstroms (Claim 16).

One of ordinary skill in the art at would recognize that properties of heat and plasma treated polymer layer would depend on treating time and the depth of treating the polymer layer. In other words, treating time and treating depth are result-effective parameters in a polymer treating process.

It is held that it is not inventive to discover the optimum or workable ranges of result-effective variables by routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have determined the optimum values of the relevant treating time and depth parameters (including those of claims 10, 11, 13, 15, 16 and 21) in Patent '858 in view of Tsukune et al '724 through routine experimentation in the absence of a showing of criticality.

Claims 1, 3, 5, 10-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US 6,383951) in view of Tamura et al (US 5,897,923) and Tsukune et al (US 5,314,724).

Li discloses a method of processing a polymer layer including Si-C bonds (See column 4, lines 23-24) deposited on a substrate such as silicon (semiconductive) wafer (See column 1, line 14; column 7, lines 28-29) from TEOS (See column 6, lines 14-23), or methyl silane and oxygen source (See column 4, lines 28-41), comprising plasma treating the deposited polymer layer using oxygen (See column 5, lines 11-13) while heating the polymer layer (See column 5, lines 57-58) to temperature of 400^0C -800^0C (See column 5, lines 46-50) to desorb moisture (See column 6, lines 3-5), and exposing the layer to a plasma such as oxygen plasma for 5-90 seconds (See column 5, lines 11-16) during the heating process (See column 5, lines 57-61). The dielectric constant of the processed polymer layer is below 3.00 (See column 6, lines 8-10). The substrate on which the polymer layer is formed may be supported on a pedestal (platen) including heating resistive heating elements (See column 5, lines 60-63). RF power of between about 0.1 kW and 1 kW, more preferably about 0.5 kW was applied to the electrodes of a plasma reactor (See column 5, lines 31-37). Li teaches that plasma treatment of polymer layer can be carried out in the same conventional plasma CVD apparatus after depositing the polymer layer (See column 5, lines 7-16). Li also teach that a process can be carried out as plasma enhanced chemical vapor deposition (PECVD) (See column 6, lines 36-38) in a *conventional* plasma treatment device (See column 3, lines 53-58) where RF power is applied to the electrodes of a plasma reactor (See column 5, lines 20-23).

Li does not expressly teach that in the conventional plasma treatment device, the substrate may be supported on an electrode to which RF power source is applied (Claim 1). However, Tamura et al teach that in a ***conventional*** **plasma treatment device,** a substrate 41 may be supported on a substrate holder 42, which is connected to high-frequency power source

44, so as to apply biased voltage to the substrate 41 (i.e. the holder 42 is an electrode) as shown in FIG. 12 (See column 1, lines 11-19), where the substrate holder 42 supporting substrate 41 is capable of controlling temperatures by heating (See column 1, lines 62-63).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a conventional plasma treatment device in Li where a substrate is supported on an electrode connected to a RF power source since Li does not limit his teaching to a particular conventional plasma treatment device, and Tamura et al teach that in a *conventional* plasma treatment device, a substrate 41 may be supported on a substrate holder 42, which is connected to high-frequency power source 44, so as to apply biased voltage to the substrate 41 (i.e. the holder 42 is an electrode), where the substrate holder 42 supporting substrate 41 is capable of controlling temperatures by heating.

As to hydrogen plasma, Li fails to teach that the treating plasma is hydrogen plasma. Tsukune et al teach that a thin silanol layer deposited from TEOS and oxygen source (See column 11, lines 45-47; column 12, lines 16-26) can be converted to a silicon oxide layer by subjecting the silanol layer to a plasma treatment at high temperature to remove organic groups **either** by oxidation reaction using **oxygen** plasma at a high temperature **or** by a reduction reaction using **hydrogen** plasma at a high temperature (See column 12, lines 25-27). In other words, Tsukune et al teach that hydrogen plasma is functionally equivalent to oxygen plasma for treating at a high temperature a thin silanol layer deposited from TEOS and oxygen source to remove water and organic groups thereby converting the silanol layer to a silicon oxide layer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used hydrogen plasma instead of oxygen plasma in Li to treat a thin silanol

layer deposited from TEOS and oxygen source with the expectation of providing the desired conversion of silanol layer to a silicon oxide layer since Tsukune et al teach that hydrogen plasma is functionally equivalent to oxygen plasma for treating at a high temperature a thin silanol layer deposited from TEOS and oxygen source to remove water and organic groups thereby converting the silanol layer to a silicon oxide layer.

One of ordinary skill in the art would have reasonable expectation of success in using hydrogen plasma instead of oxygen plasma in Li because oxygen or hydrogen plasma treatment in Tsukune et al at **450 ^{0}C** or below for **5-60 seconds** (See column 11, lines 19-33) of a thin silanol layer deposited from TEOS and oxygen source (See column 11, lines 45-47; column 12, lines 16-26) is similar to oxygen plasma treatment in Li at **400-800 ^{0}C** for **5-90 seconds** (See column 5, lines 14-16) of a thin silanol layer deposited from the same TEOS (See column 6, line 17) and oxygen source (See column 4, lines 33-34) as in Tsukune et al.

It is the Examiner's position that a polymer layer having Si-C bonds deposited by CVD from methyl silane and hydrogen peroxide would harden under heating, and the processed polymer layer of Li in view of Tsukune et al would have claimed properties such as and improved wet etch rate and would include carbon (i.e. Si-C bonds) since it is prepared and processed by the method substantially identical to that of claimed invention (See specification, page 6, lines 3-15).

As to claim 26, Li further teaches that ionizing power can be coupled to a gas by way of inductively coupled plasma (ICP) (See column 5, lines 24-29). Therefore, hydrogen plasma in Li in view of Tamura et al and Tsukune et al could be generated in ICP mode.

It is the Examiner's position that hydrogen plasma in Li in view of Tamura et al and Tsukune et al is generated in ICP mode concurrently with Reactive Ion Etch (RIE) mode, because Li teaches that the ionizing power can be coupled to the gas by way of ICP, and a substrate in Li in view of Tamura et al is supported on an electrode to which ionizing power is coupled as described in the specification on page 3, P2.

As to claims 15, 16, 21, Li fails to teach that the polymer film is treated by plasma to a depth of more than 3000 Angstroms (Claim 15) or less than 600 Angstroms (Claim 16) and has thickness of 7000-9000 Angstroms (Claim 21).

One of ordinary skill in the art at would recognize that properties of heat and plasma treated polymer layer would depend on thickness of the layer and the depth of treating the polymer layer. In other words, thickness and treating depth are result-effective parameters in a polymer treating process.

It is held that it is not inventive to discover the optimum or workable ranges of result-effective variables by routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have determined the optimum values of the relevant thickness and depth parameters (including those of claims 15, 16 and 21) in Li in view of Tsukune et al through routine experimentation in the absence of a showing of criticality.

It is the Examiner's position that the processed polymer layer in Li in view of Tamura et al and Tsukune et al would have claimed properties, e.g. the dielectric constant of less than 3.00,

reduced cracking and improved wet etch rate, since it is prepared and processed by methods substantially identical to that of claimed invention (See specification, page 6, lines 3-15).

It is held that where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, claimed properties or functions are presumed to be inherent. See MPEP 2111.02, 2112.01. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

Claims 1, 3, 5, 10-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukune et al in view of Domoto et al (US 6,354,008), Li and Tamura et al.

Tsukune et al disclose a process for forming silicon oxide film comprising placing a wafer 18 such as silicon (semiconductive) wafer (See column 11, line 64) on a lower electrode 16 (claimed platen) having a heater 19 (See Fig. 13; column 17, lines 58-65), depositing a polymer layer of organic-group (i.e. including Si-C bonds) containing silicon oxide (See column 7, lines 37-55; column 18, lines 4-8) by introducing organosilane such as TEOS and H_2O through a pipe 17 in the upper electrode 15 (See Fig. 13; column 18, lines 21-28) on the wafer while heating the wafer at 450^0C or below (See column 11, lines 19-21; column 12, lines 5-10) to accelerate crosslinking (and desorbing moisture) (See column 10, lines 49-56), stopping the supply of the organosilane and generating a plasma through the introduction of gases such as H_2 (See column 12, lines 16-26) and exposing the layer to hydrogen plasma for <u>5-60 seconds</u> to a

thickness of <u>100 nm</u> (See column 12, lines 37-40) at the same temperature (during the heating process) (See column 12, lines 16-43). The organic group is removed by the reduction reaction (See column 12, lines 26-27) thereby converting the polymer layer to silicon oxide (See column 12, lines 16-21). Plasma is RF plasma and power source is up to <u>500 W</u> (See column 14, lines 14-16). A <u>1 micron</u> thick thin film of an organic-group-containing silicon oxide was deposited with the wafer temperature being varied (See column 18, lines 6-19). The organic-group-containing silicon oxide can be deposited by **<u>plasma assisted CVD</u>** method (See column 13, lines 1-17), e.g. in a system where the silicon wafer 18 is supported on an electrode connected to the <u>ground</u> (See Fig. 13). The plasma assisted CVD deposition and the plasma treatment can be carried out <u>in the same chamber</u> (See column 12, lines 43-48; column 14, lines 5-16, 33-44).

Tsukune et al fail to teach that: (i) RF power source is connected to the electrode supporting the substrate (Claim 1); (ii) the heating step is conducted at temperature up to 550^0C (Claims 12, 13, 24) and lasts for 2-4 minutes (Claim 10) or for 3 minutes (Claims 11, 13); the power source is 400-750 watts (Claim 5) or 600 watts (Claim 13); hydrogen plasma is further generated in ICP mode concurrently with RIE mode (Claim 26); (iii) the polymer film is treated by plasma to a depth of more than 3000 Angstroms (Claim 15) or less than 600 Angstroms (Claim 16), and has thickness of 7000-9000 Angstroms (Claim 21).

<u>As to (i)</u>, Domoto et al teach that **<u>plasma assisted CVD</u>** method, which deposits a film by decomposing a source gas in a plasma (See column 1, lines 44-53), can be carried out either in an apparatus of Fig. 25, where a substrate holder is grounded or in an apparatus analogous in construction to the apparatus shown in Fig. 25, with the exception that a radio-frequency (RF) power source 83 is electrically connected to the substrate holder 77 for applying a RF power to

the substrate holder 77 (See column 23, lines 19-27). In other words, Domoto et al teach that the film of the same quality can be deposited in CVD apparatus whether substrate holder 77 is grounded or connected to a RF power source.

Tamura et al teach that in a conventional plasma treatment device described with reference to FIG. 12 (See column 1, lines 11-19) where a substrate holder 42 supporting a substrate 41 is connected to a high-frequency power source 44, the substrate holder 42 may be provided with heating means for controlling temperatures to a specified temperature (See column 1, lines 28-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an apparatus analogous in construction to the apparatus of Tsukune et al with the exception that a radio-frequency power source is connected to a substrate holder for applying a radio-frequency power to the substrate holder since Domoto et al teach that the film of the same quality can be deposited in CVD apparatus whether substrate holder 77 is grounded or connected to a radio-frequency power source, and Tamura et al teach that the substrate holder may be provided with heating means for controlling temperatures to a specified temperature.

As to (ii), Li teaches that a heat treatment and RF plasma treatment of a polymeric layer deposited on a substrate such as silicon (semiconductive) wafer (See column 1, line 14; column 7, lines 28-29) supported on a pedestal (platen) including heating resistive heating elements (See column 5, lines 60-63) from (TEOS) (See column 6, lines 14-23), may be conducted by heating the polymer layer to temperature of 400^0C -800^0C (See column 5, lines 46-50) to desorb moisture (See column 6, lines 3-5), and exposing the layer to a plasma such as oxygen plasma for 5-90 seconds (See column 5, lines 11-16) during the heating process (See column 5, lines 57-

61) using RF power of between about 0.1 kW and 1 kW, more preferably about 0.5 kW applied to the electrodes of a (See column 5, lines 31-37) to obtain the polymer layer having the dielectric constant below 3.00 (See column 6, lines 8-10).

Since Tsukune et al teach that hydrogen plasma is functionally equivalent to oxygen plasma for plasma treatment of a polymer layer deposited on a substrate such as silicon (semiconductive) wafer (See column 12, lines 21-27), it would have been obvious to one of ordinary skill in the art at the time the invention was made to have conducted treating of the polymer layer in Tsukune et al at conditions described by Li depending on particular application with the expectation of providing the desired hardened and crosslinked polymer layer, as taught by Li.

As to claim 26, Li teaches that ionizing power can be coupled to a gas by way of *inductively coupled plasma* (ICP) (See column 5, lines 24-29). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have coupled RF ionizing power in Tsukune et al so that hydrogen plasma is generated in ICP mode since Li teaches that ionizing power can be coupled to a gas by way of ICP.

It is the Examiner's position that hydrogen plasma in Tsukune et al in view of Domoto et al, Li and Tamura et al is generated in ICP mode concurrently with Reactive Ion Etch (RIE) mode, because Li teaches that the ionizing power is coupled to the gas by way of ICP, and a substrate in Tsukune et al in view of Domoto et al, Li and Tamura et al is supported on an electrode to which ionizing power is coupled as described in the specification on page 3, P2.

As to (iii), Tsukune et al further teach that the step of deposition and the step of plasma treatment are alternately *repeated* in an identical reaction chamber to form a silicon oxide film

having a *desired* film thickness on a substrate (See column 2, lines 1-3); and when a film is formed while controlling the film thickness to a small value, the occurrence of the stress can be minimized and a repetition of the formation of a thin film and the heat treatment enables the film thickness to be increased (See column 6, lines 55-68). One of ordinary skill in the art at would recognize that properties of heat and plasma treated polymer layer would depend on the power source wattage, the depth of treating the polymer layer, heating time, temperature, etc. In other words, the power source wattage, thickness and treating depth, etc. are result-effective parameters in a polymer treating process.

It is held that it is not inventive to discover the optimum or workable ranges of result-effective variables by routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have determined the optimum values of the relevant thickness and depth parameters (including those of claims 15, 16 and 21) in Tsukune et al/in view of Domoto et al and Tamura et al through routine experimentation in the absence of a showing of criticality.

It is the Examiner's position that the processed polymer layer in Tsukune et al in view of Domoto et al, Li and Tamura et al would have claimed properties, e.g. the dielectric constant of less than 3.00, reduced cracking and improved wet etch rate, since it is prepared and processed by methods substantially identical to that of claimed invention (See specification, page 6, lines 3-15).

It is the Examiner's position that the polymer layer in Tsukune et al in view of Domoto et al, Li and Tamura et al would still include some or even traces of carbon (i.e. Si-C bonds)

because: (i) it is generally impossible to completely remove every possible Si-C bond; and (ii) oxygen (or hydrogen) plasma treatment (See column 12, lines 25-26) maintained by RF power of 100-500 watts (See column 14, lines 14-16) of a thin silanol layer deposited from TEOS and oxygen source (See column 11, lines 45-47; column 12, lines 16-26) at **450 ^{0}C** or below for **5-60 seconds** (See column 11, lines 19-33) to remove organic groups (i.e. Si-C bonds) is somewhat "*milder*" than hydrogen plasma treatment of claimed invention which includes heating to a temperature of 350^{0}C -550^{0}C (See Claims 12, 13) and exposing to H_2 plasma maintained by RF power (Claim 4) of 400-750 watts (Claims 5, 7, 9) for 2-4 minutes at the same temperature (See Claims 10, 11, 13) or oxygen plasma treatment in Li at **400-800 ^{0}C** for **5-90 seconds** (See column 5, lines 14-16) maintained by RF power of 0.1-1kW (See column 5, lines 31-37) of a thin silanol layer deposited from the same TEOS (See column 6, line 17) and oxygen source (See column 4, lines 33-34). Since Li teaches that the oxygen plasma treatment leaves some carbon, and treatment of claimed invention leaves some carbon, one of ordinary skill in the art would expect that oxygen (or hydrogen) plasma treatment in Tsukune et al would also leave some carbon (i.e. Si-C bonds).

The prior art made of record and not relied upon is considered pertinent to applicant disclosure.

The following references show that in plasma CVD apparatuses plasma source is connected to a substrate electrode:

Blum et al (US 5,133,986), See column 3, lines 10-15.

Obata et al (US 5,930,077), See column 4, lines 16-18.

Grill et al (US 5,981,000), See column 3, lines 8-9, 23-24.

(10) Response to Argument

(A) Applicants argue that one of ordinary skill in the art would not modify Li in view of Tsukune et al. in the fashion suggested by the Examiner because Tsukune et al. is directed to a process intended to remove all the carbon of the processed film, and Li intends to retain carbon, and it would not be obvious to look to the plasma treatment of Tsukune et al. which intends to achieve the opposite outcome.

The argument is unconvincing. First of all, in contrast to Applicants argument, intentions of Tsukune et al are to remove carbon as much as possible not all. Nowhere Tsukune et al teach that **all** the carbon are removed from a thin silanol layer with oxygen plasma. Note that Li whose intentions, according to applicants, are to *retain* carbon, use somewhat "harsher" conditions than Tsukune et al. Compare Tsukune et al oxygen plasma treatment at **450 ^{0}C** or below for **5-60 seconds** (See column 11, lines 19-21) of a thin silanol layer deposited from TEOS and oxygen source (See column 11, lines 45-47; column 12, lines 16-26)) which, according to applicants, intends to remove **all organic groups** with Li oxygen plasma treatment at **400-800 ^{0}C** for **5-90 seconds** (See column 5, lines 14-16) of a thin silanol layer deposited from the same TEOS (See column 6, line 17) and oxygen source (See column 4, lines 33-34) as in Tsukune et al, which, according to applicants, intends to retain carbon. As it could be seen, in contrast to Applicants argument, the processes of Li and Tsukune et al are very similar to each other: if Li retains some carbon under oxygen plasma, obviously, Tsukune et al who use milder conditions than Li would retain some carbon too. **Therefore, one of ordinary skill in the art would have reasonable expectation of success in using hydrogen plasma in Li instead of oxygen plasma because**

Tsukune et al teach that the organic group can be removed either by oxidation reaction or by a reduction reaction using e.g. hydrogen plasma (See column 12, lines 25-27).

(B) Applicants argue that in addition to retaining carbon, Li et al. aims to drive water (H_2O) out of the silanol layer. There is nothing to suggest that hydrogen (H) plasma would be effective in achieving the results intended by Li.

The argument is unconvincing because Li teach that heat (not oxygen plasma) is used to drive water out from a silanol layer (See column 3, lines 59-60). Tsukune et al also teach that water can be driven out by heating a silanol layer (See column 10, lines 49-56). Therefore, *any* plasma would assist in removing water as long as it raises a temperature of the silanol layer.

(C) Appellants disagree that one of ordinary skill would modify Li to include the RF driven platen electrode of Tamura et al.

The argument is unconvincing for the reasons discussed above. Li teach that a process can be carried out as plasma enhanced chemical vapor deposition (PECVD) (See column 6, lines 36-38) in a *conventional* plasma treatment device (See column 3, lines 53-58) where RF power is applied to the electrodes of a plasma reactor (See column 5, lines 20-23). However, Li does not expressly teach that in the conventional plasma treatment device, the substrate may be supported on an electrode to which RF power source is applied (Claim 1). Tamura et al teach that in a ***conventional* plasma treatment device,** a substrate 41 may be supported on a substrate holder 42, which is connected to high-frequency power source 44, so as to apply biased voltage to the substrate 41 (i.e. the holder 42 is an electrode) as shown in FIG. 12 (See column 1, lines 11-19),

where the substrate holder 42 supporting substrate 41 is capable of controlling temperatures by heating (See column 1, lines 62-63).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a conventional plasma treatment device in Li where a substrate is supported on an electrode connected to a RF power source since Li does not limit his teaching to a particular conventional plasma treatment device, and Tamura et al teach that in a conventional plasma treatment device, a substrate 41 may be supported on a substrate holder 42, which is connected to high-frequency power source 44, so as to apply biased voltage to the substrate 41 (i.e. the holder 42 is an electrode), where the substrate holder 42 supporting substrate 41 is capable of controlling temperatures by heating.

(D) Appellants assert that one of ordinary skill in the art would not modify Tsukune et al. in view of Li in the fashion suggested by the Examiner because the objective of the hydrogen treatment of Tsukune et al is to remove carbon groups from the film; Li has the opposite objective - to retain the carbon and its attendant low-k dielectric properties; and Domoto et al is directed to the fabrication of electric shaver blades, and is apparently relevant to the Examiner in that it discloses that a CVD chamber can include a grounded platen electrode (FIG. 25) or an RF-driven platen (FIG. 29).

The argument is unconvincing because Tsukune et al and Li seem to have the same objective such as converting organic-group containing silanol layer into a silicon layer, as was discussed above.

Tsukune et al fail to teach that an organic-group-containing silicon oxide can be deposited using **plasma assisted CVD** method (See column 13, lines 1-17). The plasma assisted CVD deposition and the plasma treatment can be carried out in the same chamber (See column 12, lines 43-48; column 14, lines 5-16, 33-44), e.g. in a system where the silicon wafer 18 is supported on an electrode connected to the ground (See Fig. 13).

Domoto et al teach that **plasma assisted CVD** method for depositing a film by decomposing a source gas in a plasma (See column 1, lines 44-53), can be carried out either in an apparatus of Fig. 25, where a substrate holder is grounded or in an apparatus analogous in construction to the apparatus shown in Fig. 25, with the exception that a radio-frequency (RF) power source 83 is electrically connected to the substrate holder 77 for applying a RF power to the substrate holder 77 (See column 23, lines 19-27). In other words, Domoto et al teach that the film of the same quality can be deposited in CVD apparatus whether substrate holder 77 is grounded or connected to a RF power source.

(E) Appellants point out that the Examiner has cited no authority whatsoever for the proposition “(i)" that it is Etgenerally impossible" to completely remove every possible Si-C bond. This statement is unsubstantiated, speculative, and not supported by the record.

The argument is unconvincing because as was discussed above.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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